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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/845,111	04/27/2001	Keith J. Williams	80,245	1619

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EXAMINER	
KIANNI, KAVEH C	
ART UNIT	**PAPER NUMBER**
2877	

DATE MAILED: 05/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/845,111	WILLIAMS ET AL.	
	Examiner	Art Unit	
	Kevin C Kianni	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) *22 and 23* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *22 and 23* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 July 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *6* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Newly submitted claims 22 and 23 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: I. Claims 1-21 are directed to fiber optical modulation system wherein PZT is disposed in the first PM coupler. II. Claims 22-23 are directed to a transmitter having a fiber optic modulator system with a PZT is disposed in the second PM coupler and second PM coupler for combining outputs of the ohase modulator and the PZT. Inventions I, claims 1-21 and II, claims 22-23 are related as mutually exclusive species in an intermediate-final product relationship. Distinctness is proven for claims in this relationship if the intermediate product is useful to make other than the final product (MPEP § 806.04(b), 3rd paragraph), and the species are patentably distinct (MPEP § 806.04(h)). In the instant case, the intermediate product is deemed to be useful as an optical switch for switching of particular optical paths in a WDM communications rather than a modulator in a communications system and the inventions are deemed patentably distinct since there is nothing on this record to show them to be obvious variants. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions anticipated by the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

1.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 22-23 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-5, 9-15 and 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Townsend (US 5675648).

Regarding claim 1, Townsend teaches a fiber optic modulator system (shown at least in figure 4), comprising: an optical source 48; a first coupler FC for splitting a signal received from said source into two optical paths (see fig. 4, item the input FC of the interferometer; also col. 4, lines 8-16 and 45-48), said two paths forming a Mach Zender Modulator (see col. 3, lines 26-33; wherein modulating mach-zender interferometer forming a MZM); a phase modulator 41 disposed in a first optical path of the first PM coupler (see fig. 4, items modulator 41 modulated by a modulation driver 49 is disposed in first/second optical paths of coupler FC ; col. 4, line 49); a second coupler

FC for recombining said first and second optical paths (shown in fig. 4, item the combiner second coupler FC combining the first and second optical paths); and a detector (ADP: avalanche photo diode) for detecting the output from said second coupler (see fig. 4, item ADP detecting output of the second coupler FC; also col. 6, lines 15-20).

However, Townsend does not specifically teach: (A) a piezo-electric transducer (PZT) disposed in a second optical path of the first PM coupler, and (B) wherein the above coupler is a PM coupler. Nevertheless, Townsend states that his interferometer, consisting of couplers FC, can include a PZT; and that his modulation system is designed for minimum amount of polarization change in which optical polarization in the system would be maintained (see col. 2, lines 1-8). Thus, it would have been obvious to a person of ordinary skill in the art when the invention was made to dispose a PZT in a second/first optical path of the coupler FC and replace Townsend's couplers with that of conventional PM couplers in order to produce an optical system that includes the above limitations since resultant system would enable long distance communication effectively (col. 2, lines 2-9; see US 5272513 proved herein as prior art) and since it has been held that duplication of the essential working parts of a device and/or rearranging parts of an invention involves only routine skill in the art. In re Japikse, 86 USPQ 70; and St Regis Paper Co. v. Bemis Co., 193 USPQ.

Regarding claim 2, Townsend further teaches a fiber tap for sampling output from the second PM coupler (see fig. 4, item tap fiber of the output coupler FC connector to

the photodiode APD for sampling) ;a d.c. photodetector APD for detecting the output of said fiber tap; and a phase locked loop system disposed to receive a signal from said d.c. photodetector APD, said PLL system providing a feedback signal to said PZT for controlling the relative phases of said first and second optical paths (see fig. 4, feedback loop from photodiode APD to PC/PZT and col. 6, lines 1-20; wherein the relative phases of the first and second optical paths is changed as a result of change in the fiber).

Regarding claim 3, Townsend further teaches wherein said PZT controls the optical path length o said second optical path (see col. 6, lines 10-18).

Regarding claim 4, Townsend further teaches wherein said phase modulator is made of lithium niobate ($LiNbO_3$) (see col. 4, lines 49-50).

Regarding claim 5, Townsend further teaches wherein said phase modulator imprints a signal into said first optical path for modulating a signal from said optical source (see fig. 4, items 48-49 and 41; col. 4, lines 34-40). However, Townsend does not specifically teach wherein the above signal is an analog signal. Nevertheless, Townsend states that the modulation system operates in standard analog mode (col. 5, line 41). Thus, it is well known to those of ordinary skill in the art that a system working in analog mode would transmit an analog signal to a destination, in order to enable long distance communication effectively (col. 2, lines 2-9).

Regarding claim 9, Townsend further teaches fiber disposed in said first optical path between said phase modulator and said second coupler (see fig. 4, items fibers). However, Townsend does not teach wherein the above fiber is erbium doped fiber amplifier. The examiner takes official notice regarding this limitation since it is very conventional using such fiber (see for example US 6259552 provided herein as prior art), since such a fiber in the modulation system would provide predetermined relationship between the phase or polarization of the transmitter and receiver (col. 2, lines 15-17).

Regarding claim 10, Townsend further teaches: a second phase modulator disposed in said second path (see fig. 4, the item phase modulators 41/42 are in first/second optical paths; col. 4, lines 49-50).

Regarding claim 11, Townsend teaches in a fiber optic communication system (shown at least in figure 4) having at least one fiber optic modulator 41, a method of enhancing the performance of the communication system (col. 2, lines 2-8) comprising: providing an optical source 48; splitting signals from said optical source into first and second paths (see fig. 4, item 48 and splitter FC; also col. 4, lines 8-16 and 45-48), said first and second paths forming a Mach-Zender Modulator cavity (see col. 3, lines 26-33; wherein modulating mach-zender interferometer forming a MZM cavity in which the optical paths are modulated through modulators 41/42 forming MZM cavity); phase

modulating the signals in said first optical path (see fig. 4, items modulators in first/second optical paths; col. 4, line 49); controlling optical path length of said first and second paths (see polarization compensation PC for the rapped fiber rings in the first/second optical paths controlled with a PZT, and col. 6, lines 1-18); combining the signals in said first and second paths (shown in fig. 4, item the combiner second coupler FC combining the first and second optical paths); and detecting the combined signals (see fig. 4, item ADP detecting output of the second coupler FC; also col. 6, lines 15-20). Regarding the limitation PM couplers, the arguments presented in rejection of claim 1 is analogous in rejection of claim 11.

Regarding claim 12, Townsend further teaches sampling the combined signals (see fig. 4, item tap fiber of the output coupler FC connector to the photodiode APD for sampling); detecting the sampled signals (see detector ADP); and controlling the relative phases of said first and second paths (see fig. 4, feedback loop from photodiode APD to PC/PZT and col. 6, lines 1-20; wherein the relative phases of the first and second optical paths is changed as a result of change in the fiber).

Regarding claims 13-14, Townsend further teaches wherein a LiNbo3 phase modulator modulates the signals in said first optical path (see col. 4, lines 49-50).

Regarding claim 15, Townsend further teaches inputting a signal to control the modulation of signals in said first path (see fig. 4, items 48-49 and 41; col. 4, lines 34-

40). However, Townsend does not specifically teach wherein the above signal is an analog signal. Nevertheless, Townsend states that the modulation system operates in standard analog mode (col. 5, line 41). Thus, it is well known to those of ordinary skill in the art that a system working in analog mode would transmit an analog signal to a destination, in order to enable long distance communication effectively (col. 2, lines 2-9).

Regarding claim 17, Townsend further teaches disposing a second phase modulator41/42 in said second path to allow for dual drive modulation (see fig. 4, items modulators 41/42 in first and second paths and col. 4, line 1).

Regarding claim 18, Townsend further teaches wherein the output of said second PM coupler is detected using a plurality of photodetectors (col. 4, lines 49-52).

Regarding claim 19, Townsend further teaches wherein the outputs of said photodetectors are subtracted to implement a balanced detection scheme (see col. 4, line 51-col. 5, lines 49-67, wherein the subtraction/summation of signals are carried out by photo-detectors ADPs in which signal levels are balanced by minimized or maximized signals level, see col. 6, lines 18-20).

Regarding claim 20, Townsend further teaches a fiber optic link system for transmitting signals from a source to a destination (shown at least in figure 4) having a fiber optic modulator 41/42, the fiber optic modulator comprising: an optical source 48; a first coupler FC for splitting a signal received from said source into two optical paths (see fig. 4, item the input FC of the interferometer; also col. 4, lines 8-16 and 45-48), said two paths forming a Mach Zender Modulator (see col. 3, lines 26-33; wherein modulating mach-zender interferometer forming a MZM); a phase modulator 41/42 disposed in a first optical path of the first coupler (see fig. 4, items modulator 41 modulated by a modulation driver 49 is disposed in first/second optical paths of coupler FC ; col. 4, line 49); a piezo-electric transducer (PZT) disposed in a second optical path (see polarization compensation PC for the rapped fiber rings in the first/second optical paths controlled with a PZT, and col. 6, lines 1-18); a second PM coupler for recombining said first and second paths; and a detector for detecting the output of said second coupler (see fig. 4, item ADP detecting output of the second coupler FC; also col. 6, lines 15-20). Regarding the limitation PM couplers and a PZT in second optical path of the first coupler, the arguments presented in rejection of claim 1 is analogous in rejection of claim 20.

Regarding claim 21, the arguments presented in rejection of claim 2 is analogous in rejection of claim 21.

4. Claims 6-8 and 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over combination of Townsend and Farina et al. (US 5193128).

Regarding claims 6-7 and 16 Townsend teaches all limitations that the base claims that these claims depend on. Townsend further teaches wherein said phase modulator enables phase modulation of signals in said first optical path by imprinting an analog signal onto said first path (see analogous rejection presented in rejecting claim 5 is analogous in rejection of claim 16); the phase modulation being detected by said second coupler (fig. 4, second FC); wherein said phase modulator maintains optical polarization of signals from said optical source 48 (see col. 2, lines 1-8) and controlling the length of said second optical path (see col. 6, lines 10-18).

However, Townsend does not specifically teach wherein the above underlined signal is an RF signal. Nevertheless, Farina states that the frequency range of the above signal is 100 MHz. This limitation is more specifically taught by Farina. Farina teaches a MZM modulation system (shown in fig. 1-2) that includes the above limitation (see col. 6,lines 37). Thus, Farina provides a modulation system for reliable operation of MZM (col. 2, lines 60-68). Therefore, it would have been obvious to a person of ordinary skill in the art when the invention was made to modify Townsend's modulator's transmitter 49 frequency by including the frequency range taught by Farina in order to produce a MZM system that includes the above limitation, since the resultant system would provide predetermined relationship between the phase or polarization of the transmitter and receiver (col. 2, lines 15-17).

Regarding claim 8, Townsend teaches a laser source 48, however, Townsend does not explicitly teach wherein the laser is of a diode pumped ND:YAG ring cavity laser. The examiner takes official notice of source as being is a diode pumped ND:YAG ring cavity laser in which this source is conventional (see US 5239401, fig. 9, item 130; col. 10, line 10, provided herein as prior art) since such a system would provide predetermined relationship between the phase or polarization of the transmitter and receiver (col. 2, lines 15-17).

Response to Arguments and Amendment

5. Applicant's argument filed on March 19, 2003 have been fully considered but they are not persuasive.

Applicant alleges (page 5, 3rd parag. and page 6, 1st and 4th parag.) that Townsend does not teach a phase modulator in any of the optical paths of the first FC. Examiner responds that Townsend teaches a phase modulator 41 disposed in a first optical path of the first PM coupler (see fig. 4, items modulator 41 modulated by a modulation driver 49 is disposed in first/second optical paths of coupler FC; see also col. 4, line 49). Regarding applicant's question (page 6,3rd parag. and page 6, 2nd parag.) of Townsend's polarization compensator the examiner responds that the communication modules 1 and 2 are part of a communication system that performs routing of signals, thought this limitation is not claimed by the applicant. And the limitation a PZT is disposed in a second optical path is a part of restricted claims 22-23.

Regarding applicant's assertion that Townsend does not have a photodetector in the modulator/transmitter, the examiner first responds that the claim limitation specifies

a detector for detecting the output from said second coupler in which Townsend indeed teaches a detector (ADP: avalanche photo diode) for detecting the output from said second coupler (see fig. 4, item ADP detecting output of the second coupler FC; also col. 6, lines 15-20).

THIS ACTION IS MADE FINAL

6. This action is made FNAL after applicant's amendment to the above stated claims. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaveh Cyrus Kianni whose telephone number is (703) 308-1216. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 6:00 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font, can be reached at (703) 308-4881.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 308-9051, (for formal communications intended for entry)

or:

(703) 308-5397, (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA., Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 305-4770.

Kevin Cyrus Kianni
Patent Examiner
Group Art Unit 2877

Frank Font
Supervisory Patent Examiner
Group Art Unit 2877

May 12, 2003